



A Proposal for Developing a Market Surveillance Program

The Egypt Capital Markets Development Project



CHEMONICS INTERNATIONAL INC.

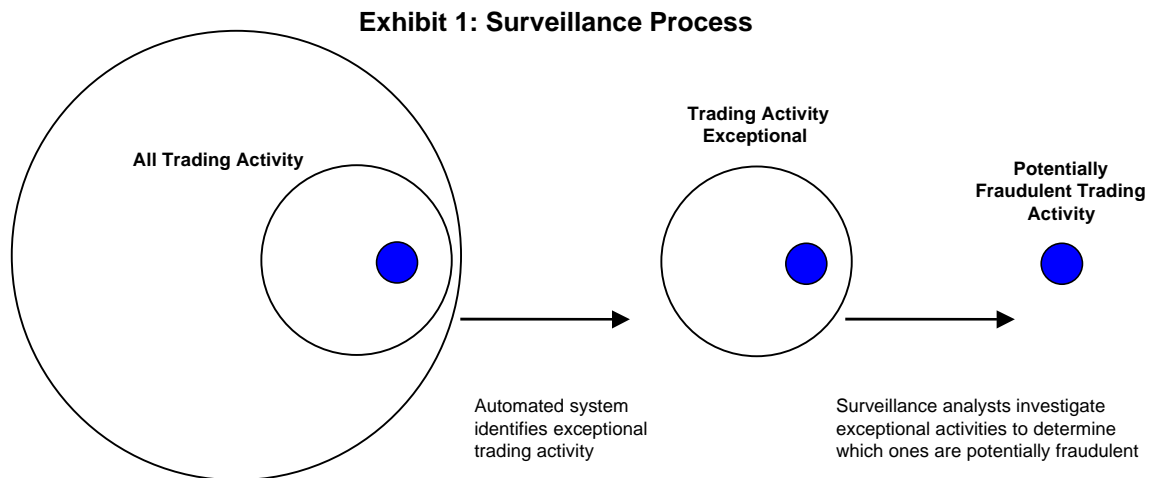


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A PROPOSAL FOR DEVELOPING A MARKET SURVEILLANCE PROGRAM

Purpose: To create an automated system and procedures that will enhance and support the CMA's market surveillance capabilities.

The number of fraudulent transactions on any securities exchange is only a small subset of the total number of transactions. It is impossible for the surveillance analysts to manually examine every trade as it occurs. For this reason, most developed exchanges utilize software programs to identify those transactions that warrant investigation. These surveillance programs identify unusual (or exceptional) trading trends and patterns—activities that may indicate that fraudulent transactions are taking place. Trained surveillance analysts and managers then examine these trading activities to determine which ones are potentially fraudulent. Exhibit 1 graphically describes this process.



Proposal: The Capital Markets Development (CMD) project will assist the CMA's Information Technology and Surveillance Departments with designing and implementing a market surveillance program that will accomplish the following:

- A. Identify exceptional trading activities—trading activities that the surveillance analysts and managers should investigate further.
- B. Establish procedures to investigate—and track the investigation of—these exceptional trading activities to determine which ones may indicate fraudulent behavior.
- C. Generate outputs that can be used to assess the performance of the surveillance analysts and assist upper management with monitoring the overall effectiveness of the surveillance function. It should also generate information that can be used as evidence to prosecute illegal acts, as well as information that can be used by the research department to better understand the behavior of the market.

The remainder of this paper outlines our proposal for developing a market surveillance program in more detail. The three main features listed above divide the discussion, and the final section outlines the resource requirements and amount of time that will be required to complete the project. Once the CMA commits to the program and assigns resources, we

estimate that the first two stages (A and B above) can be completed in approximately twelve weeks. Stage C will be initiated after the initial software and procedures are in place and operational.

A. Identifying Exceptional Trading Activities

In order to construct a program that will identify exceptional trading activities, three inter-related steps will be required. First, CMD, with the CMA Information Technology and Surveillance Departments, will design a database that maintains historical records for each issue traded on the stock exchange. Second, a software program will be designed to perform a series of calculations on the records to determine the range of normal trading for each issue. Third, the program will be run as an “overnight batch process” to update the record of trading norms daily. Finally, parameters to select for exceptional trading activities will be developed so that, when run against on-line trading data, the program will generate an exception report for the analysts.

1. Creation of a historical database

The surveillance program is based on a historical database of trading information for each issue. When designing the database, the following information will be considered:

- Trading volume
- Share volume
- Price range
- Average trade size
- Price variation between trades
- Price movement during the day

Trading volume, share volume, and price ranges are already available at the CMA, although they are not represented in a conveniently useable form. With this information, the IT department, with CMD assistance, will derive the other three pieces of information for each issue traded on the exchange. See Exhibit 2 for an example of a database page.

Exhibit 2: Sample Page from Historical Database

Trade Date	Number of Trades	Shares Traded	Maximum Trade Price	Minimum Trade Price	Last Trade Price	VWAP	Average Trade Size	Average Variation bet. Trades	Average Deviation From VWAP	Number of Trades with < 100 Shares	Number of Trades bet. 100 & 1000 Shares	Number of Trades with >= 1000 Shares
1-Mar-99	405	307800	37.48	36.51	36.98	36.79	760	0.017	0.287	56	234	115
2-Mar-99	263	255564	36.9	36.6	36.7	37.02	971.72624	0.019	0.285	25	139	99
3-Mar-99	425	427846	36.75	35.99	36.01	36.72	1006.6965	0.022	0.546	47	235	143
4-Mar-99	544	599339	36.4	34.6	34.62	36.14	1101.7261	0.021	1.119	42	316	186
7-Mar-99	588	537806	35.95	33.9	35.3	35.02	914.63605	0.031	0.496	74	313	201

2. Determining the range of normal trading activity

A program will be designed to perform a series of calculations to determine the average trading range for each issue, on a weekly, monthly, and annual basis. The database of normal trading activity will be used for determining the parameters for selecting exceptional trades. As each issue exhibits a different behavior and this behavior differs from period to period, all issues should be processed and the database of normal trading activity should be updated regularly.

3. Updating trading norms

The program will be run as an “overnight batch process,” updating the record of trading norms on a daily basis. Information on the behavior of issues over set time periods should also be maintained in order to reveal trends that are only obvious over extended periods of time.

4. Running the historical data against trading data to generate exception reports

Using the database of historical information and trading norms (which, as discussed above, will be recalculated daily) and some basic assumptions, the surveillance managers and analysts, with the support of the IT department, will be able to establish the parameters (or “flags”) to select trading activities that should be investigated. When establishing the parameters, the following should be considered:

- The parameters should be evaluated and updated regularly by the surveillance department management to ensure that they are effective.
- Changing parameters regularly will keep potential violators off guard.
- The changes to the parameters will be based on the quantifiable information gathered by the surveillance program, maintaining the effectiveness of the automated system.
- The “flags” should be kept confidential, as knowledge of the specific parameters for selection of exceptional trades would allow potential violators to operate unnoticed by the program.

Certain assumptions will be used to narrow the number of trades examined. For example, if the profit to be made from a particular trading activity is small, potential violators will not be willing to risk exposure. Implementing such an assumption will also allow the program to immediately eliminate a large number of transactions that are not likely to indicate improper activity.

Exhibit 3: Sample Parameters or Flags

Description	Day Norm	Factor	Parameter (Day Norm * Factor)
Average Variation Between Trades:	0.017	5	0.085
Average Trade Size:	760	2	1520
Average Deviation from VWAP:	0.287	2	0.574

After setting the parameters, the system will run real-time trading information against them, selecting those trades that the surveillance staff should review more carefully. These trades are not necessarily fraudulent; nevertheless, they warrant review by the surveillance analysts and managers.

B. Investigating Exceptional Trading Activities

As noted above, fraudulent trades are only a small subset of the exceptional trading activity that can be selected by the automated system. Therefore, procedures need to be established to investigate these exceptions. The investigations should be conducted by trained analysts and supervised by trained managers. CMD will help the CMA establish procedures for these investigations, and will add features to the surveillance software (during phase C) that will help organize the surveillance staff's work. The project will also offer training to the staff, including internships with surveillance departments at US stock exchanges and workshops, to help them effectively interpret the exceptional trades listed by the system.

1. Review of exceptional trading activities

The surveillance analysts will review those trades that have been identified as exceptional, combining their review with an examination of trading before and after the specific trade. By utilizing their experience and the historical data generated by the program, the analysts can determine whether a particular exceptional trade has a legitimate explanation. In this way, the program and database will enhance the effectiveness of analysts markedly.

The CMA, with CMD assistance, may also want to design a stand-alone program to select the first trade of each day for each issue in order to identify attempts to show false interest in those issues.

It should be noted that even with sophisticated tracking systems, most surveillance departments rely upon the trading-floor brokers to point out unusual activities, as those brokers have a vested interest in maintaining an efficient market. For this reason, the program will also pay attention to relatively inactive issues, as these are likely to escape the attention of brokers, who are usually focused on more actively traded securities.

The surveillance analysts should also observe and track the impact of other factors on the market. Among the factors that should be considered are the following:

- Activity on the trading floor
- Trading performed by brokers
- Information relative to issuers
- The market's reaction to news
- Market regulations and rules

2. Contacting the broker if a particular trade cannot be explained

In those instances where the analyst cannot ascertain the cause of a particular exceptional trade, and where there is not a reasonable explanation, he or she is responsible for contacting the executing broker for more information. If the broker's explanation still warrants further investigation, the analyst should consult with the surveillance manager. The manager may require the broker to produce records and be physically present for questioning. If a particular trade still cannot be explained, the case and supporting documentation will be reported to the CMA's senior management for action.

3. Coding all actions by surveillance analysts

The system will require the analyst to electronically sign each stage of the review process and electronically “sign-off” on the trade when the investigation is complete.

In addition to identifying exceptional trades, the surveillance program will provide a mechanism for tracking and organizing the work of the department. It will also provide a record of the activities of individual members of the surveillance staff, allowing management to identify any inappropriate activities. Such a tracking and accountability mechanism will help increase professionalism, and ultimately justify increasing the amount of information to which the surveillance analysts have access.

Exhibit 4: Sample Exception Report and Staff Sign-Off Page

Trade ID	Execution Date / Time	Volume	Trade Price	Variation	Exception	Resolution	Signature
225	03/01/99 11:40:42	200	36.61	0.10	Big variation between trades		
341	03/01/99 11:49:53	2931	36.79	1,411	Large Volume		
246	03/01/99 12:05:33	100	36.61	0.10	Big variation between trades		
229	03/01/99 12:20:44	3000	36.65	1,480	Large Volume		
171	03/01/99 13:18:06	450	37.09	0.09	Big variation between trades		
170	03/01/99 13:18:17	2000	37.00	480	Large Volume		
170	03/01/99 13:18:17	2000	37.00	0.09	Big variation between trades		
189	03/01/99 13:21:40	2000	37.10	480	Large Volume		
189	03/01/99 13:21:40	2000	37.10	0.10	Big variation between trades		
73	03/01/99 13:22:03	3000	37.10	1,480	Large Volume		
71	03/01/99 13:22:27	2457	37.10	937	Large Volume		
70	03/01/99 13:23:33	300	37.25	0.15	Big variation between trades		
220	03/01/99 13:24:06	2000	37.30	480	Large Volume		
217	03/01/99 13:24:31	175	37.40	0.610	Big deviation from VWAP		
217	03/01/99 13:24:31	175	37.40	0.10	Big variation between trades		
218	03/01/99 13:24:31	1000	37.39	0.600	Big deviation from VWAP		
216	03/01/99 13:24:33	500	37.26	0.13	Big variation between trades		
214	03/01/99 13:27:21	1000	37.30	0.10	Big variation between trades		
211	03/01/99 13:27:54	1900	37.30	380	Large Volume		
78	03/01/99 13:32:40	1665	37.40	145	Large Volume		
78	03/01/99 13:32:40	1665	37.40	0.610	Big deviation from VWAP		
78	03/01/99 13:32:40	1665	37.40	0.10	Big variation between trades		

C. Management and Research Outputs from the System

The surveillance program will provide outputs that can be used by the CMA’s senior management to assess the performance of the surveillance staff and evaluate the overall effectiveness of the surveillance function, and that can be used as a record for prosecution. As a side-benefit, the system will also generate information on the market behavior that can be used by the CMA’s research and other departments.

1. The program will allow management to monitor performance and effectiveness

A properly designed database and surveillance program will provide the tools necessary not only to maintain and review records, but also to allow for the sorting and reconfiguration of the information to suit management demands. This will ensure that parameters are properly used and modified. Management will also be able to review the quality of resolutions and staff workflow.

2. The exception trade report will form a basis for prosecution of violations

Results of extended investigations and the follow-up reviews will be retrievable from the database. This file will contain the broker names, issuer names, and the trading activity that resulted in a violation alert. The database will also contain a record of the actions taken by the surveillance staff and management to investigate the alleged violation. Together, this information will provide the foundation of any legal prosecution.

Management can also use the information produced by the database and surveillance program when studying possible modifications to laws and regulations.

3. The database will provide statistical resources for other departments

The initial reports that record historical trends, but not surveillance methodology (as this should be kept in limited distribution), will be useful to share with other departments at the CMA. The statistical resources will help the research department develop trend reporting and perform analysis based on long-term information.

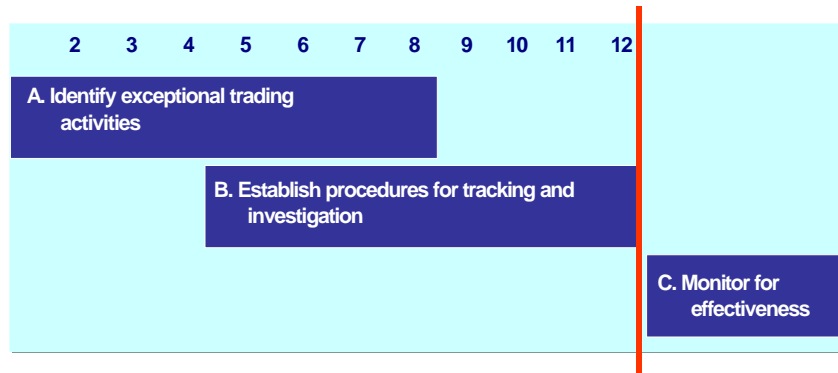
D. Proposed Timeline and Resource Needs

Exhibit 5 outlines the resources required from the CMA and CMD to complete stages A and B of the surveillance program. CMD will work with the designated staff on all phases of the development process. It will also provide ongoing on-the-job training and workshops, as well as internships at US exchanges, for the Surveillance Department's management and staff.

Exhibit 5: Resource Needs (Stages A and B)

CMA Resources	CMD Resources
<ul style="list-style-type: none"> 4 programmers from the IT Department and the IT Department Manager Surveillance Manager and his staff 	<ul style="list-style-type: none"> Stock Exchange Operations Advisor Senior Systems Analyst/Programmer Short-Term Surveillance Workspace Designer Computer equipment (part of CMD's procurement on behalf of the CMA) DT2 resources for training (internships with US exchanges)

With a commitment of the resources outlined above, we estimate that the development of the database, surveillance software, and procedures (stages A and B) will require approximately 12 weeks, divided as shown in Exhibit 6. Stage C, the development of additional outputs from the program, will be initiated after the software and procedures are in place.

Exhibit 6: Timeline for Implementation**E. Conclusion**

We request approval from CMA Chairman H.E. Abdel Hamid Ibrahim to proceed with the initial two parts of this proposal—(A) developing a surveillance program to identify exceptional trading activities and (B) developing procedures for, and an automated system to monitor, the investigation of exceptional trading activities. We will work with the CMA on the third part—(C) generating management and research outputs from the system—after the initial software and procedures are in place and operational.

By implementing this proposal, the CMA Surveillance Department will greatly enhance its market surveillance capabilities. Such enhancements will help the CMA to more effectively conduct surveillance on the market and more efficiently utilize its resources. The proposal will also provide the CMA management with mechanisms for monitoring staff performance and the effectiveness of the surveillance function in general.

CMD will assist the CMA with development of the program and procedures by providing an experienced programmer and a stock exchange operations expert, as well as by providing training for the CMA's surveillance staff. CMD will also commit resources to assist the CMA with redesigning its surveillance workspace and with procuring additional hardware to support the surveillance and other departments. These activities are included in our current work plan.

After the initial activities are completed, it is possible for CMD to offer additional assistance at the CMA's request, including adding new features to the surveillance program and continuing training for the surveillance analysts and managers.